posterior wall of the pylorus on the duodenal side; the stomach and the duodenum were dilated.

CASE XXIX.—Female, aged thirty-five years. *Symptoms:* pain in the right iliac region; abdominal distention; fever; anæmia. *Diagnosis:* gastric ulcer; cholecystitis. *Operation,* December 13, 1905; gastroenterostomy; appendectomy. There was an ulcer near the pylorus; the duodenum was distended; the gall-bladder was distended with 10 c.c. of black, sandy fluid; the appendix was cicatricial, 4 cm. long.

CASE XXX.—Female, aged thirty-eight years. *Symptoms:* continual pain in the stomach; tenderness in the epigastrium; hæmatemesis; headache. A gastroenterostomy had been done six months previously. *Diagnosis:* pyloric ulcer; dilated duodenum; cholecystitis. *Operation,* December 29, 1905; cholecystostomy. The pylorus was indurated; the duodenum was enlarged and adherent.

CASE XXXI.—Female, aged twenty-nine years. *Symptoms:* continual gastric pain; epigastric tenderness. The patient had been operated upon one year previously for gastric ulcer. The pain recurred. *Diagnosis:* pylorospasm; dilatation of the duodenum. *Operation,* January 1, 1905; gastroenterostomy—the opening enlarged. The gastric side of the pylorus was constricted; the duodenum was dilated.

ORIGINAL ARTICLES.

THE SUFFICIENCY OF SIMPLE INTERCOSTAL INCISION IN ACUTE EMPYEMA, WITH A REPORT OF FIVE CASES.

BY JAMES FARQUHARSON LEYS, M.D.,
SURGEON, U. S. NAVY.

Now and then, in a case of flat chest, it will be found that an intercostal space affords an opening too narrow for adequate drainage of an acute empyema, and a piece of rib must be excised. Such cases are exceptional. In cases of empyema which have become chronic and in which it is evident that adequate drainage cannot be secured without excision of a portion of one or more ribs, the propriety of rib resection is not to be questioned. Such removal of bone is required in cases in which it has become evident that lung expansion does not proceed and cannot be hoped for as an effective aid in the expulsion of pus. Where the chronic empyema is very extensive and there is no expansion, or only a slight ineffective expansion with no improvement, one of the extensive exsections first brought forward by Estlander and Schede is indicated; the lung being firmly fixed in its contracted position by adhesions and failing to expand to meet the chest wall, the chest wall must be enabled to fall in and meet the lung as the only way of securing the obliteration of the pus cavity. These somewhat formidable looking operations have been remarkably successful in suitable cases and their place in surgery is well established.

So well established, indeed, is the operation of rib resection in suitable cases of empyema, that it has come to be the first operation thought of by most practitioners as soon as the diagnosis has been established. The operation which involves a removal of bone has somehow taken a dominant position in the minds of medical men, and the operation which is as much simpler, as it is more suitable in the majority of acute cases, is too often lost sight of.

When suppuration supervenes in what was originally, and has for some considerable time remained, a serofibrinous pleurisy, or when the clear or slightly turbid fluid of a tuberculous pleurisy at last becomes frankly purulent, the lung has been long contracted, in many cases its elasticity has been permanently impaired, thick coagula are deposited upon the walls of the pleural pus cavity, and firm adhesions already exist, preventing expansion of the lung. In such cases of subacute and chronic empyema, rib resection will probably be required to secure adequate drainage.

Probably the majority of cases of empyema, however, are acute in their origin and course, the condition being a sequel of an acute infectious disease. Purulent pleurisy is thus a common sequence of scarlet fever and typhoid fever, and a rarer one of measles and whooping cough. It has its origin sometimes, of course, in a penetrating wound of the chest or some other surgical injury. But in a very large proportion of the cases, probably the majority, acute empyema is a sequel of pneumonia, and invasion of the pleura by the pneumococcus constitutes in such cases the dominant if not the sole infection which is its cause. The majority of the acute empyemas seen in family practice by the medical man are of this class.

It is not the purpose of this paper to bring any new fact to the notice of the profession, but to repeat and emphasize a fact which was long ago established but which for some reason seems to be periodically lost sight of; and this is that the best treatment for such cases, as soon as the diagnosis of empyema has been made on the signs and symptoms and confirmed with the exploring needle, is *simple incision through an intercostal space.*

The failure of the profession in general and the family practitioner in particular to realize this may be referable to one or another of several reasons. First, the man whose work is almost entirely medical and who is not accustomed to do any surgical work beyond the suturing of wounds and the opening of superficial abscesses cannot quite bring himself to think of thoracotomy as the minor operation which it really is. He has a feeling that in promptly opening the thoracic cavity he would be undertaking alone a grave operation in which he ought to have the benefit of consultation and assistance. If, entertaining these doubts, he turns to the literature for help in clearing up his ideas before proceeding farther in the case, his confidence in the efficacy of the simple operation, and in his own ability to perform it without at least some special instruments or materials not contained in his bag, is apt to be still further shaken by what he reads. In some standard text-books published within the past five years resection of bone in all cases, acute as well as chronic, is represented as advisable without, apparently, any weighty or valid reason for such an opinion.

The reasons sometimes stated are (1) that the removal of a small piece of rib will enable the operator to introduce a finger into the pleural cavity and break up any adhesions encountered, thus favoring drainage; and (2) that the chest wall will be enabled to collapse to a certain extent and meet the lung in the obliteration of the pus cavity. Against these alleged advantages it must be said (1) that in the acute empyemas following immediately upon lobar pneumonia pleural adhesions have not commonly formed; and if adhesions have formed, those encountered and broken up by the exploring finger might well be those at the margin of the pus cavity concerned in limiting its extent and in no way interfering with drainage, and their breaking up could only be harmful as permitting further extension of the suppurative process in the pleura. And (2) the removal of a few inches of one rib does not enable the chest on the affected side to fall in to any considerable extent, and a resection sufficient to bring about such collapse and consequent permanent deformity is not necessary to the cure of these acute cases and, therefore, not to be desired. Furthermore, in cases in which the pneumococcus is not the sole or even the dominant infecting organism, but in which there is a mixed pyogenic infection, sometimes of a specially virulent type, osteitis or periostitis has resulted in the bone exposed by an unnecessary resection in several reported cases.

In most of the literature of the past fifteen years some special forms of apparatus, intended to exclude air, or to secure drainage by siphonage or suction, or to provide for irrigation of the cavity, are described as desirable. It may be readily conceded that there is no objection to the use of specially contrived drainage tubes, single and double, long and short, flanged to prevent their recession into the chest, or provided with siphon attachments, if such contrivances as these are at hand. But they are seldom at hand outside of a hospital, and in any and all cases they are quite unnecessary. If because of a fancied necessity for some such appliances, or a mistaken belief that simple thoracic incision is not a sufficient and effective operation, or a fear that it is too serious a one to be undertaken unaided, or because of a lack of practice in and a feeling of timidity toward surgical procedures in general, or for any other reason, the isolated medical man hesitates in these acute empyemas, his hesitation will be confirmed when he encounters reports of cases in which pleural collections of pus have been happily absorbed and complete recovery has ensued without surgical interference. By these reports he will be still further enabled to justify his hesitation to his own conscience and be encouraged to hope that this excessively rare outcome may ensue in the case which he has on his hands.

Resection of a rib, then, as already stated, is not only quite unnecessary, but positively undesirable in practically all acute empyemas. Before the profession arrived at a rational treatment of acute empyema by simple incision for the evacuation of pus, two other erroneous ideas, entertained at first on theoretical grounds, had to be abandoned. One was that the opening must be so made and dressed as to prevent the entrance of air; the other, that irrigation of the cavity with an antiseptic fluid would disinfect it and was necessary to advance the cure. These errors, being apparently based on sound theory, died hard. As regards the exclusion of air from the cavity the idea that this was necessary was based on a false physiological teaching that the expansion of the lung depended entirely on the maintenance of the pleural vacuum. It is now well known that the lung has a natural tendency to expand, and if its tissue be not seriously diseased it will exercise this vital function of expansion against a normal atmospheric pressure outside, if not forcibly prevented from doing so. Air exclusion was later insisted on as necessary to prevent fresh infection of the pleura by germs which would be carried in. This argument belonged to the era when antiseptic theory had taken a firm hold on the profession but a rational antiseptic practice had not yet been developed. It was of the era in which operations were performed and babies delivered under the carbolic spray. We now know that pus may be allowed to flow out freely and air to enter as freely, through an open drainage tube between the ribs, with no likelihood that the entering air, strained through an ample dressing of many layers of gauze which had been sterilized by heat and wrung out of bichloride solution, will introduce any fresh infection. The notion that antiseptic irrigation of the cavity could be effective for its disinfection was based upon an erroneous idea as to the penetrating and germ-destroying power of a weak antiseptic solution in brief contact with the surface of infected tissues. Not only is its disinfectant power insignificant under such circumstances, but in irrigation a pressure is apt to be exerted by the liquid, the effect of which is to distend the contracting cavity repeatedly to its original dimensions, to prevent the formation or the permanency of new adhesions and the holding by them of ground gained in the reduction of the cavity; and even, if too great a hydrostatic pressure be unintentionally brought to bear in the use of the syringe or the column of liquid used in irrigation, to make a harmful compression on the expanding lung. Convulsions and sudden collapse have resulted in a number of instances.

Simple intercostal thoracotomy has been successfully performed since the time of Hippocrates and has shown itself again and again to be an adequate operation for acute empyema; and it is unaccountably strange how this fact has gained a temporary recognition only to be forgotten again while the profession groped in a confusion of ideas and in efforts to elaborate and improve surgical procedures which were as much more complicated as they were less suitable. It is interesting to trace this fact through the literature of the past two hundred years or so. In the midst of unsuccessful attempts to deal with pus in the chest by other and more elaborate procedures, someone would treat a case by simple incision. Recovery would follow, the profession would be surprised, report the case as something remarkable, and go on with aspirations, siphons, valve-like incisions, irrigating apparatus, special forms of drainage tubes, and repeated failures to deal successfully with the disease.

Thus going back to 1694, a time anterior to the beginnings of modern surgery, when the surgeon was practically a non-professional man, we find an account by Riedlinus,[1] a German physician, of a case of empyema which he treated with medicaments and with the cautery. A leech or surgeon was at last called in to bleed the patient. Though the chronicler does not think it worth while to mention the leech's name, he appears to have been a better man than his principal. His ministrations were certainly worth more to the patient. Noting intercostal swelling he made a free incision through the right fifth interspace, which was followed by the evacuation of a total of ten pints of pus within a short time following and complete cure within seven weeks. Warner,[2] of Guy's Hospital, London, in 1751, made a three-inch incision in the tenth interspace four inches from the spine, in a man of twenty-seven years, placing the patient in a sitting posture, and evacuated twenty ounces of pus. Recovery was perfect in six weeks. Isaac Rand,[3] of Cambridge, Mass., in 1756, in a case of empyema in a blacksmith, incised an intercostal space, evacuating five pints of pus at the time. He states that " the abscess and the external opening healed in sixteen days and he recovered his usual state of health." In 1783, twenty-seven years later, the man was still following his business as a blacksmith.

Such satisfactory results from so simple a procedure, though they continued to be reported from time to time, seem to have been ignored or forgotten, for in 1833 we find Prof. Joseph Pancoast[4] giving a clinical lecture on a case of empyema in which he advised caution and conservatism in dealing with it surgically, and telling at the same time in the course of his lecture the following story: "A case of abscess of the chest of some interest occurred a few years ago in the upper part of this State (Pennsylvania) in the practice of a medical friend and was cured in a way somewhat *unique*, which would seem to make it worthy of recital. A man was seized with some affection within the thoracic cavity which resisted the prescriptive treatment of his physician. The stethoscope at that period had not come into general use and the case was so ambiguous that its character was not revealed by its symptoms. The patient and his friends entertained the opinion that he was laboring under pulmonary consumption. No swelling, no discoloration, existed externally upon the thorax; but the patient, from the internal sensation produced by the disease, had a settled conviction that there was a *gathering* within. Taking a seat by an unfrequented side of the house, he plunged the blade of his penknife opposite the seat of pain between the ribs. He was found with pus flowing from the wound; a large quantity was discharged from the narrow wound. From that time his symptoms were relieved and the patient finally recovered."

---

[1] Misc. Acad. Nat. Curios, Lips. et Francof., 1694, 3 decuria. i. 216.

[2] Phil. Trans. of London, 1751-52, xlvii. 407.

[3] Med. Communicat., Mass. Med. Soc., 1790-1808, Boston, 1808, i. 66.

[4] AMERICAN JOURNAL OF THE MEDICAL SCIENCES, Phila., 1833, xiii. 93.

The adequacy of treatment by simple, direct, free incision could not get itself recognized, however; and it has not been sufficiently realized yet. The profession continued to flounder in confusion regarding the treatment of empyema, many continued to advocate what they believed to be a wise conservatism, and in 1876 Dr. Goodhart, of Guy's Hospital, wrote, "It has long been known that an empyema may often be safely let alone." With the development of antiseptic surgery, however, the pendulum of opinion and practice swung too far the other way and has not yet returned to rest.

In an able paper entitled "Rib Resection in Empyema, Indiscriminate and Excessive Practice Thereof," published in 1899, Dr. Edmund Andrews,[1] of Chicago, deplores the fact that some surgeons "go so far as to advocate the resection of ribs in all cases of empyema," and says: "They forget the splendid results we have had for twenty-five years in cases that do not need resection. When we learn some new thing in surgery we seem straightway to forget what we knew before." Dr. Andrews, while recognizing the sufficiency of simple intercostal incision without resection, still considered it desirable to have specially constructed flanged drainage tubes and recommended a double tube of the kind devised by Hancock. He advocated, too, a daily irrigation with boric acid solution and said: "In this treatment we soon learned that air in the pleural cavity had no septic influence, if the cavity itself was well wet with a mild antiseptic fluid. The germs were destroyed and the cavity remained sterile." The objections to such routine irrigation, generally unnecessary and useless and sometimes dangerous, have been already set forth; and experience has shown that air-entrance, under a proper gauze dressing, is innocuous, independently of an irrigation which can have little or nothing to do with the cessation of the septic process in the pleura after free egress has been given to the pus. And the special drainage tube has no practical advantage over the ordinary rubber tube, always on hand, which can be fenestrated with the operator's own scissors in a few seconds and flanged with two large safety pins crossed through its outer end.

---

[1] Journal of the American Medical Association, 1899, xxxii., 451.

It has remained for the author of a work on the practice of medicine to state the truth as to the proper treatment of acute empyema without ambiguity and with a simplicity and conciseness not found in any surgical work which has come to the notice of the present writer. Osler[1] says: "When it has been determined by exploratory puncture that the fluid is purulent, aspiration should not be performed except as preliminary to operation or as a temporary measure. . . . It is sad to think of the number of lives which are sacrificed annually by the failure to recognize that empyema should be treated as an ordinary abscess by free incision. The operation . . . is by no means serious. A majority of the cases get well, providing that free drainage is obtained, and it makes no difference practically what measures are followed so long as this indication is met. The good results in any method depend upon the thoroughness with which the cavity is drained." It is unfortunate that such a direct statement of surgical good sense is lacking in most of the surgical text-books, and that the simple truth which it embodies has to be forgotten from time to time, only to be re-discovered and repeated in an effort to impress it upon the general practitioner.

The following five cases of acute empyema were treated in the U. S. Naval Hospital at Newport between March, 1901, and October, 1902. They were all in boys between sixteen and seventeen and a half years of age. In four of them the empyema was an immediate sequel of lobar pneumonia. A rapid and complete recovery ensued in each of these cases. In the other case, Case II, the empyema was developed from a serofibrinous pleurisy. Recovery proceeded more slowly in this case, and the patient purchased his discharge from the service before it was complete.

These five cases were all in that decade of life in which croupous pneumonia has the lowest mortality. All except Case I were boys of robust physique. They may be considered, therefore, to constitute a rather favorable series. The five cases were consecutive, and they were the only ones occurring in the hospital during the two years of my service. None of our fatal cases during that two years had empyema. We had, during that time, about one hundred and ten cases of croupous pneumonia, nearly all in the second decade of life, with eight deaths; and the fact that empyema was never overlooked in such a large series convinced me that its diagnosis is easy and that failure to recognize it ought practically never to occur.

---

[1] Practice of Medicine, New York, 1896.

Though these five consecutive cases were all treated in a hospital where every appliance was on hand or easily obtainable, and where professional assistance could be had if needed, they were handled with the help of one or two nurses, without professional assistance (except in one case), without general anæsthesia, and without any special appliance; that is to say, they were treated precisely as every medical man should be prepared to manage a case in his practice. Local anæsthesia was produced with a lump of ice dipped in coarse salt and held against the chest, or with a spray of ether from a hand atomizer, or with a spray of ethyl chloride if a tube of it was at hand. The patient was propped with pillows into a sitting posture. The only implements used were (1) a scalpel for incision, (2) a pair of blunt straight scissors for enlarging it, (3) two pairs of hæmostatic forceps to hold it open for the flow of pus, to introduce and advance the drainage tube, and to catch bleeding vessels if they were encountered, (4) about twelve inches of three-eighths inch rubber drainage tubing fenestrated on alternate sides at intervals of an inch, and (5) four large safety pins at least two inches long. All these articles, the dressings, and the patient's skin were, of course, duly sterilized beforehand.

CASE I.—E. J. M., apprentice, aged seventeen years, enlisted at New Orleans. Admitted to hospital March 4, 1901. Croupous pneumonia, left lower lobe. A few days before admission had been surveyed for impediment in speech, mental weakness and poor physique. March 17th, signs of effusion in right pleura. Temperature declined irregularly and was normal March 18th, 19th and 20th. March 20th, exploration showed effusion to be serous. Effusion increased very rapidly and fever returned. March 24th, effusion reached clavicle and aspiration removed 1925 c.c. of creamy pus. March 25th, patient propped in sitting posture; under local spray of ether from hand atomizer, free incision in sixth interspace near posterior axillary line. Two fenestrated tubes six inches long inserted. About 1500 c.c. more of pus removed at operation. Temperature fell to normal. Good drainage maintained. Daily dressing. Pulmonary gymnastics with Ralston James water bottles begun March 31st. Liberal diet and tonics. By April 15th, daily discharge amounted to only two ounces. Tubes shortened little by little. One tube removed April 19th. Pus showed no tubercle bacilli; pneumococci and other cocci abundant. Discharge did not cease until May 12th. May 14th, last tube removed. Gymnastics continued. Fistula healed completely May 24th. Cure perfect. Discharged from service well fleshed and in excellent health except for the defects for which he had been surveyed previous to his illness.

CASE II.—T. De W. T. E., apprentice, aged sixteen years, enlisted at Chicago. Admitted to hospital November 5, 1901.

Acute pleurisy, left side. Temperature 103.6°, pulse 120, respiration 36. Friction heard. Temperature declined; effusion appeared and by November 10th reached the clavicle. Aspirated 1250 c.c. of flocculent serum, very slightly purulent. Moderate fever continued. November 16th, aspirated 700 c.c. of dark thin pus, which deposited a sediment of pure thick pus amounting to one-fourth of its volume after twenty-four hours. November 21st, aspirated 950 c.c. thick creamy pus. November 22, patient being propped in sitting posture, a piece of ice dipped in salt being used for local anæsthesia, free incision in sixth interspace left side just anterior to latissimus dorsi. Two fenestrated tubes, seven and eight and a half inches long, inserted. Free discharge. Ralston James exercise begun November 23d. Tubes shortened constantly and removed December 3d. Wound appeared to be healing, but fever recurred, and fluid being evident it was reopened December 17th with discharge of about 500 c.c. of pus. Eight inch tube inserted. Pus discharge continued in varying quantity and pulmonary expansion progressed very slowly. On March 21st he was progressing satisfactorily, the discharge being very little and the patient steadily gaining flesh and strength, when, by his own desire, he was discharged from the service that he might complete his recovery at home.

Case III.—B. F. D., apprentice, aged sixteen years and four months, enlisted at Port Royal, S. C. Admitted to hospital March 13, 1902. Croupous pneumonia, right lower lobe. Crisis March 22d. Temperature rose again and took on a septic course. Pleural effusion appeared. March 30th, exploratory aspiration found pus. March 31st, patient propped in sitting posture, ice and salt for local anæsthesia, free incision in sixth interspace in front of latissimus dorsi, large amount of pus evacuated. One tube. April 2d, developed a parotitis (epidemic on the station at the time). Parotid swelling nearly gone by April 6th. Ralston James exercise. Tube progressively shortened. Forced out by fully expanded lung on May 7th. Continued to do well, gaining one-half pound daily on full diet. July 10th, he had completely recovered his health and strength and was discharged to duty. On July 13th he came down with measles, which was epidemic at the time.

Case IV.—H. W. S., apprentice, aged seventeen years and three months, enlisted at New York. Admitted to hospital May 5, 1902. Croupous pneumonia right lower lobe. Crisis May 17th. Temperature took on an irregular course thereafter. June 10th, empyema diagnosed but pus not struck by exploration in axilla. Aspiration through ninth interspace just under angle of scapula evacuated about 500 c.c. of pus. Later on the same day, free incision in this situation under ethyl chloride local anæsthesia, with patient in sitting posture. Rubber tube eight inches into chest. This was connected with long tube terminating in bucket of boric acid solution colored with methyl blue on floor beside bed, with interruptions of glass tubing at two points, near wound and near bucket, to observe flow of pus, siphon drainage being thus established. No aspiration of the solution in the bucket occurred. An excellent and steady flow of pus was maintained and Ralston James exercise practised. The apparatus was removed on June 18th, and a short tube left in with simple dressing. Tube left out July 10th. July 16th, no discharge, no fever. July 25th, entirely healed, no dressing, gaining flesh rapidly. Discharged to duty August 9th; recovery complete.

Case V.—R. H. B., apprentice, aged sixteen years and eight months, enlisted at Saginaw, Mich. Admitted to hospital August 24, 1902. Croupous pneumonia, left lower lobe. Crisis, September 1st, followed by irregular temperature. Pleural effusion developed. September 13th, aspiration sixth interspace in midaxillary line drew 100 c.c. of pus. Next day, September 14th, patient propped to sitting posture, local anæsthesia with ethyl chloride, free incision same situation, about 350 c.c. pus withdrawn. Two tubes introduced. Ralston James exercise. Expanding lung pushed out the last of a shortened tube October 4th. Wound healed by October 15th. Recovery complete, and discharged to duty, October 27th.

TRAUMATIC INTRAPERITONEAL RUPTURE OF THE BLADDER:

WITH A REPORT OF TWO CASES AND AN ANALYSIS OF ONE HUNDRED AND TEN CASES TREATED BY LAPAROTOMY.

By Astley Paston Cooper Ashhurst, M.D.,

SURGEON TO THE OUT-PATIENT DEPARTMENT OF THE EPISCOPAL HOSPITAL; ASSISTANT SURGEON TO THE ORTHOPÆDIC HOSPITAL AND TO THE DISPENSARY OF THE GERMAN HOSPITAL, PHILADELPHIA.

Having had occasion recently to operate on a patient with an intraperitoneal rupture of the urinary bladder, an operation which is rather rare even in these days of hourly abdominal sections, I have thought it worth while to record the case, and to present a statistical study of all the similar operations, one hundred and ten in number, of which reports have been found.

Of the three patients with this lesion that I have myself observed, the first was operated on by my father at the Pennsylvania Hospital while I was still an undergraduate, and was reported by him to the Philadelphia Academy of Surgery in 1898; while the two others came under my notice at the Episcopal Hospital, and have not hitherto been published.

Case I.—Otto N., German, aged fifty-one years (No. 2449, P. E. H., 1904) was brought to the Episcopal Hospital shortly after mid-